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ZOOLOGY

Vol. 3, No. 5, pp. 53-92, Pls. 9-14 December 10, 1906

CONTRIBUTIONS FROM THE LABORATORY
OF THE
MARINE BIOLOGICAL ASSOCIATION OF SAN DIEGO

XII

ADDITIONS TO THE COPEPOD FAUNA OF THE SAN DIEGO REGION

BY

CALVIN OLIN ESTERLY

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BY
CALVIN OLIN ESTERLY.

The forms dealt with in this paper were obtained principally from two collections made in deep water during the summer of 1905. These collections are Nos. 1030 and 1045. The data are as follows: 1030, plankton, July 20, 1905; 000 net, 400 fathoms to surface, temperature 9.25 C. at 400 fathoms, 2:30 p.m.; 1045 plankton, NW. by W. from La Jolla, 10 miles, July 27, 1905; 000 net, 300 fathoms to surface, temperature 19.3 C. at surface, 4 p.m. Another collection that yielded good material was obtained December 16, 1905, 15 miles west of La Jolla, at 450 fathoms, on a trip to San Clemente Island. A few new forms were taken at other times, and the data will be given with the description of the animals. It has been possible to add a number of forms that are new to the region and were not included in my previous report (Esterly, :05). No claim is made for originality of description in such cases.

The synonymy for genera included in the present paper is not intended to be complete; it is given more for convenience than

for any other reason, and reference is made as a rule only to such works as are more accessible and give description of the genus in question. To compensate for this, a list is appended containing the names and literature references of new species in the genera dealt with here, that have been recorded since the appearance of Giesbrecht's last work ('98). The synonymy of species recorded here for the first time as from this region is given as complete.

It is hoped that the arrangement of figures will at least facilitate comparisons. Drawings of like parts are on the same plates, and if more than one species of a genus is dealt with, the figures are grouped, it is believed, so that comparison of one with another will be easy. This may be said also for different genera, since, for example, the fifth feet of males or females are all on one plate, whether they belong to animals in the same genera or not.

The following is a list of the species treated in this paper:—

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Family CALANIDAE.

Genus **Spinocalanus** Giesbrecht.

Spinocalanus, Giesbrecht ('92), p. 52, 209; ('98), p. 31.
Spinocalanus, Sars (:01), p. 22.

Female: Resembling *Clausocalanus* in general. Cephalothorax of four segments, rostrum wanting. Abdomen of four segments, symmetrical. Anterior antennae 24-jointed; maxilla, maxillipeds, and swimming feet set with spines, the feet as in *Clausocalanus*, but of the usual shape, and terminal joint of outer ramus in second to fourth pairs with five inner marginal bristles. Fifth pair of feet absent.

Male unknown.

Spinocalanus major n. sp.

Female: Closely resembles *S. abyssalis* Giesbrecht. Head, and last thoracic segment rounded, not produced. Fourth joint of inner ramus of posterior maxilliped with an outer marginal bristle (lacking in *S. abyssalis*). The outer marginal bristles of the first and second joints of the outer ramus of the first foot are much shorter and stouter than in *S. abyssalis*, and the inner margin of those joints is provided with long and rather heavy bristles, no such character appearing in *S. abyssalis*.

Length: 1.6 mm.

Coloration: Whitish, translucent, but without pigment.

Occurrence: One female. Coll. 946; plankton taken with Kofoid water bucket NW. by W. from La Jolla, 5 miles, June 30, 1905; 200 fathoms. Depth at station, 210 fathoms. Temperature 9.5 C. at 200 fathoms. Midday.

In the absence of figures, the rounded last thoracic segment in *S. major* seems to distinguish it from *S. magnus* Wolfenden, in which the "last thoracic segment is produced on each side." The latter species is considerably the larger.

Genus **Gaetanus** Giesbrecht.

Gaetanus, Giesbrecht ('92), p. 53, 219; ('98), p. 32.

Female: Rostrum short, with one point. The front of the head on the dorsal surface bears a median spine (Pl. 9, figs. 3, 4, 5). Cephalothorax and abdomen symmetrical, each of four segments, the last thoracic segment lengthened on each side into a long spine (Pl. 10, fig. 24). Anterior antennae 23- or 24-jointed; inner ramus of the posterior antennae about four-fifths as long as the outer ramus. Outer ramus of the first foot 2- or 3-jointed, inner ramus of the second foot 2-jointed. Inner border of the first basal of the fourth foot provided usually with lamellae or spines at the distal portion instead of bristles (Pl. 13, fig. 76).

Male: Head with the spine which is characteristic of the genus. Abdomen of five segments. Anterior antennae 22-jointed; mouth parts retrograded. Fifth feet much as in *Gaidius;* outer ramus of each foot 3-jointed, inner rami rudimentary and 1-jointed. The inner ramus of the left foot is slender and rod-shaped, that of the right foot heavy and club-shaped (Pl. 14, fig. 90).

Gaetanus brevicornis n. sp.

Pl. 9, fig. 4; pl. 12, fig. 55.

Female: Head (Pl. 9, fig. 4) with a spine and quite similar to *G. armiger* Giesbrecht, but heavier. Anterior antennae extend about to the end of the furca. The second joint of the outer ramus of the posterior antenna has a small process, as in *G.armiger.* The lamellar process on the first basal of the posterior maxilliped (Pl. 12, fig. 55) is more prominent than in *G. miles.* The outer ramus of the first foot is indistinctly 2-jointed, first basal of fourth foot with a row of delicate hairs, quite different from the tube-like bristles of *G. miles,* and not so heavy even as in *G. armiger.*

Length: 4.3 mm.

Coloration: Opaque and without pigment.

Occurrence: One female, Coll. 1030. Type in the collection of the University of California.

G. brevicornis resembles the female of *G. armiger* Giesbrecht chiefly in the form of the head. There are specific differences in the posterior maxilliped, in which the lamella on the basal joint is longer and more prominent than in *G. miles*, while in *G. armiger* it is only indicated. There is no reason for considering *G. brevicornis* the same as *G. major* Wolfenden or *G. caudani* Wolfenden (Canu?), since the lamella is present on the posterior maxilliped (absent in *G. major*); the cephalic spine is similar to *G. armiger* (in *G. caudani* it resembles *G. miles*). The single specimen of *G. brevicornis* is very nearly adult. The length is greater than that of *G. armiger* (3.2 mm) and less than that of *G. major* (5 mm. or more).

Gaetanus unicornis n. sp.

Pl. 9, fig. 3; pl. 12, fig. 54; pl. 13, fig. 76.

Female: A large *Gaetanus* in which the cephalic spine is very long and straight, pointing slightly up instead of down (Pl. 9, fig. 3). The anterior antennae are 24-jointed and as held in the dead animal reach beyond the furca by at least the last four joints. The second joint in the outer ramus of the posterior antennae is without a process; the lamella on the first basal of the posterior maxilliped is present, but does not have the rod-like extension of *G. brevicornis* or *G. miles* (Pl. 12, fig. 54). The outer ramus of the first foot is distinctly 2-jointed, and the first basal of the fourth foot (Pl. 13, fig. 76) has tube-like bristles resembling those in *Gaidius*.

Length: Adult females, 6.5 mm.

Coloration: Rather opaque and without pigment in formalin.

Occurrence: Six females, Coll. 1045. Type in the collection of the University of California.

Gaetanus clarus n. sp.

Pl. 9, fig. 5; pl. 14, fig. 90.

Male: Head and spine resembling *G. miles*, but the spine is longer and the front of the head below it protrudes considerably (Pl. 9, fig. 5). The anterior antennae are about as long as the

cephalothorax, and the first basal of the posterior maxilliped is without the lamellar appendage; the rest of the oral organs are considerably retrograded. The outer ramus of the first foot is indistinctly 3-jointed; the first basal of the fourth foot is without the tube-like bristles or hairs characteristic of the female of the genus. The fifth feet (Pl. 14, fig. 90) as described for the genus. The distal end of the inner margin of the second joint of the outer ramus in the right foot has a group of four or five heavy spines.

Length: 5.3 mm.

Coloration: Semi-translucent in formalin and without pigment.

Occurrence: Two males, Coll. 1045. Type in the collection of the University of California.

The spine on the head distinguishes these animals as *Gaetanus,* and the shape of the spine and the head from the other members of the genus.

Genus **Chirundina** Giesbrecht.

Chirundina, Geisbrecht ('95), p. 245.

Female: Allied to *Undeuchaeta* and *Euchirella.* Rostrum 1-pointed, short; forehead with crest (Pl. 9, fig. 2); lateral angles of last thoracic segment (Pl. 10, fig. 28) produced into short, blunt processes. Inner ramus of second antennae half as long as outer; maxilla as in *Euchirella,* but bristles more numerous. Outer ramus of first foot 2-jointed; first basal of fourth foot without spines.

Male (new): Like female in general characters, except that the last thoracic segment is not produced, but smoothly rounded. Outer ramus of first foot 3-jointed (Pl. 12, fig. 58). Fifth feet somewhat resembling those of *Gaidius* or *Gaetanus;* each foot biramus, inner rami 1-jointed, outer rami 3-jointed; inner ramus of right foot club-shaped, that of left foot long and slender; the terminal joint of the outer rami is spine-like (Pl. 14, fig. 86, 87).

Chirundina streetsi Giesbrecht.

Pl. 9, fig. 2; pl. 10, fig. 28; pl. 12, fig. 58; pl. 14, figs. 86, 87.

Chirundina streetsi, Giesbrecht ('95), p. 250, pl. 1, figs. 5-10.
Chirundina streetsi, Giesbrecht ('98), p. 34.

With the characters of the genus.

Length: Male, 4.3 mm. Female, 5 mm.

Coloration: Whitish in formalin, but without pigment.

Occurrence: Two females, one male, Coll. 1030.

The male is new. There can be little doubt that the specimen is a *Chirundina*, although the structure of the fifth feet might place it in *Gaidius* or *Gaetanus*.

Genus **Euchirella** Giesbrecht.

Euchirella, Giesbrecht ('92), p. 54, 232; ('98), p. 34.
Euchirella, Esterly (:05), p. 150.

Euchirella curticauda Giesbrecht.

Pl. 9, fig. 6; pl. 10, fig. 27; pl. 12, fig. 62; pl. 13, fig. 67.
Euchirella curticauda, Giesbrecht ('92), p. 233, pl. 15, figs. 3, 13, 25; pl. 36, figs. 19, 20; ('98), p. 36.
Euchirella curticauda var. *atlantica*, Wolfenden (:04), p. 116.

Female: Forehead (Pl. 9, fig. 6) with a high crest, rostrum lacking. Abdomen (Pl. 10, fig. 27) short, less than one-sixth as long as the cephalothorax, symmetrical. Anterior antennae as long as the cephalothorax; inner ramus of posterior antennae one-fourth as long as outer ramus, first joint of latter with a knob-like projection (Pl. 12, fig. 62); second joint of outer ramus with five bristles. First joint of outer ramus of fourth foot with a series of ten to thirteen tooth-like spines on the inner margin (Pl. 13, fig. 67).

Male unknown.

Length: Female, 3.6 mm.

Coloration: Opaque, without pigment.

Occurrence: Two females, Coll. 1030.

Genus **Euchaeta** Philippi.

Euchaeta, Giesbrecht ('92), p. 55, 245; ('98), p. 37.
Euchaeta, Esterly (:05), p. 156.

Euchaeta californica n. sp.

Pl. 9, fig. 11; pl. 10, figs. 26, 34.

Female: Eminence on forehead low; last thoracic segment rounded laterally, with a heavy tuft of hairs on each side (Pl. 10, fig. 34). Genital segment symmetrical (Pl. 10, fig. 26), the genital swelling large and with two low flanges guarding the orifice (Pl. 9, fig. 11). The anterior antennae are not as long as the cephalothorax; first outer marginal lobe of the maxilla with seven bristles. The outer ramus of the first foot is clearly 2-jointed, and there is a very small bristle in the middle of the concave outer border of the first joint; the distal bristle of this joint reaches half-way to the end of the terminal joint of the ramus. The terminal bristle is long and slender. In the second foot the external spine of the first joint of the outer ramus reaches well beyond the end of the first outer marginal spine of the third joint. The second outer marginal of this joint is very long, reaching to the end of the third outer marginal; the border of the third joint is deeply concave between the second and third external spines.

Length: Female, 8 mm.

Coloration: Rather opaque, red in bristles of maxillipeds and feet. The hairs on the furcal bristles are iridescent.

Occurrence: One female, Coll. 1030, and on the winter trip to San Clemente. Type in the collection of the University of California.

The shape of the genital segment will distinguish *E. californica* from the other members of the genus, except possibly *E. flava* Giesbrecht. The size of the latter (3.2 mm), and the number of bristles on the proximal outer lobe of the maxilla (five in *flava,* seven in *californica*), are distinguishing characters.

Euchaeta propinqua n. sp.

Pl. 9, fig. 9; pl. 10, figs. 30, 33.

Female: Approaching *E. californica* in general. The shape of the head in lateral view is different, the frontal eminence being lower and hardly visible; the rostrum is shorter and heavier (Pl. 9, fig. 9). The genital segment is symmetrical, and has the flanges guarding the orifice, as in *E. californica*, but they protrude much farther ventrally and there is a knob-like swelling behind, between them (Pl. 10, figs. 30, 33). The segment is not so swollen laterally as in *E. californica*. The terminal joint of the anterior antennae is longer in *californica* than in *propinqua* by one-fifth the length of the joint in the latter; and the terminal joint in *propinqua* exceeds the next by almost one-sixth the length of the former, or one-fifth the length of the latter. First foot as in *E. californica*. In the second foot the marginal bristle of the second joint of the outer ramus does not reach the end of the first marginal of the third joint, nor does the second marginal of the third joint reach the base of the third marginal by about the length of the latter. (In *californica* the second marginal reaches to the end of the third.)

Length: Female, 9 mm.

Coloration: Rather opaque, no pigment in antennae; red in the mouth parts and feet, including the bristles, and in the body immediately adjacent to the mouth parts.

Occurrence: One female on the winter trip to San Clemente. Type in the collection of the University of California.

Euchaeta tenuis n. sp.

Pl. 9, fig. 12; pl. 10, figs. 29, 31.

Female: Eminence on forehead slightly protruding (Pl. 9, fig. 12). Sides of last thoracic segment rounded, sparsely pubescent (Pl. 10, fig. 29). Genital segment with a long flap guarding the orifice on the right; the segment is otherwise symmetrical (Pl. 10, fig. 31). The second terminal bristles of the furca are much longer than any of the others. Anterior antennae reaching the end of the furca; the last joint is longer than the preceding

one by about one-sixth the length of the latter. First outer marginal lobe of the maxilla with eight bristles, inner ramus with four. Outer ramus of first foot 2-jointed, without spine in middle of outer border of first joint; the distal spine of the joint extends well beyond the end of the second joint. The distal spine of the second joint of outer ramus of the second foot reaches to the end of the first outer marginal spine of the third joint; the middle spine of the third joint reaches over half way to the base of the third outer marginal.

Length: Female, 6 mm.

Coloration: Rather translucent, with a light shade of red along the sides of thoracic segments and in the feet.

Occurrence: One female, Coll. 1045. Type in the collection of the University of California.

The form of the genital segment is a sufficiently distinct character for this species.

Euchaeta spinifera n. sp.

Pl. 9, fig. 8; pl. 11, fig. 35; pl. 14, figs. 82, 83.

Male: Head (Pl. 9, fig. 8) much as in the female of *E. tenuis;* last thoracic segment long, rounded at the sides, and with a curved, thorn-like projection on the dorsal margin (Pl. 11, fig. 35). Abdomen with genital and anal segments equal in length, the second segment longer than any other, and nearly as long as the last two. Anterior antennae reaching to end of furca. First foot with 3-jointed outer ramus, the outer marginal of the first joint very small. In the second foot the outer margin of the third joint of the outer ramus is deeply concave distal to the middle spine; the outer marginals are all short and blunt, except the middle spine of the third joint, which reaches half way to the base of the third. The fifth feet are slender; inner ramus of the left foot half as long as the first joint of the outer ramus. The second joint of the ramus ends distally in a pyramidal toothed process (Pl. 14, figs. 82, 83). The terminal joint of the outer ramus of the right foot ends bluntly.

Length: Male, 5.1 mm.

Coloration: No pigment in body or appendages, but the plumose bristles of the feet and furca are iridescent.

Occurrence: Two males, Coll. 1030. Type in the collection of the University of California.

These animals are distinct from any males of the genus hitherto described, and may belong to some species described from the female. I prefer to consider them new, especially since no females were taken in Coll. 1030 that even remotely suggest a relationship, although the shape of the head is like that of *E. tenuis*. That species, however, was obtained in Coll. 1045. Possibly additional material will make it clear to what species the animals belong. It is certainly as safe to make new species of unknown males as to guess at relationships, in view of the sexual dimorphism which extends to other structures than the fifth pair of feet.

Euchaeta dubia n. sp.

Pl. 9, fig. 7; pl. 11, fig. 36; pl. 13, fig. 66; pl. 14, figs. 84, 85.

Male: Head regularly rounded (Pl. 9, fig. 7), without eminence. Last thoracic segment rounded laterally. Genital and anal segments of equal lengths, second segment as long as the last two; the genital segment has a low, rounded projection on the dorsal border as seen in side view (Pl. 11, fig. 36). Anterior antennae as long as the cephalothorax; first foot with 3-jointed outer ramus, first joint without outer marginal. Third joint of outer ramus of second foot with concave outer border between second and third outer marginals; first outer marginal not reaching base of second. Outer margin of the joint from base of second marginal to base of third, two and one-half times as long as the length of the former spine (Pl. 13, fig. 66). Fifth feet (Pl. 14, figs. 84, 85) of the usual form, inner ramus of left foot very small, about one-seventh the length of the first joint of the outer ramus. The toothed projection at the end of the second joint is bifid at the distal end, and the portion on the inner margin carries small denticulations.

Length: Male, 7.8 mm.

Coloration: Without pigment, but furcal bristles are iridescent.

Occurrence: Two males, Coll. 1030, two on the winter trip to San Clemente. Type in the collection of the University of California.

It will be seen that these animals occurred in two collections; in one of these (1030) *E. californica* was found and in the other *E. propinqua.* It is difficult to say with any certainty whether the males belong to one species or the other, and for that reason, and in the absence of structures pointing one way or the other, I have kept the sexes in separate species. Possibly immature forms will be found later that will make clear the true relations.

Euchaeta tonsa Giesbrecht.

Pl. 9, fig. 10; pl. 10, fig. 32.

Euchaeta tonsa, Giesbrecht ('95), p. 251, pl. 3, figs. 9, 10; ('98), p. 40.

Female: The species lies in the group with *norvegica, flava,* and *californica,* but is distinct from them in the absence of the tufts of hair on the last thoracic segments; the segment instead of being rounded laterally ends in a small tooth (Pl. 10, fig. 32). The frontal eminence (Pl. 9, fig. 10) is rather high and slightly protruding. The shape of the genital segment is different from that in any of the allied species; the eminence is prominent and lies far back in the segment, so that its posterior border almost coincides with that of the segment, and the hirsute transverse line behind the eminence is lacking. The first lobe on the outer border of the maxilla has nine bristles (*norvegica* nine, *flava* five, *californica* seven). The terminal joint of the outer ramus of the second foot is similar to that in the other species; the middle bristle on the outer margin reaches beyond the base of the third.

Length: Female, 6.1 mm.

Coloration: Body rather opaque, without pigment. The distal bristles of the posterior maxilliped and all those of the anterior are a magenta red.

Occurrence: Twelve females, Coll. 1030.

Genus **Scolecithrix** Brady.

Scolecithrix, Brady ('83), p. 56.
Scolecithrix, Giesbrecht ('92), p. 56, 265, 764; ('98), p. 41.
Scaphocalanus, Sars, (:00), p. 35.
Scolecithrix, Esterly (:05), p. 163.

The genus *Scolecithrix* of Giesbrecht contains a large number of species, all of which have been retained in the genus by Gies-

brecht, although he formed the genus *Lophothrix* (Giesbrecht, '95) to receive a certain form which later (Giesbrecht, '98) he returned to *Scolecithrix*. In his opinion the genera *Amallophora* Scott, *Scaphocalanus* Sars, and *Lophothrix* Giesbrecht belong to *Scolecithrix* Brady. Sars (:02b, pp. 50, 54, 57) recognizes the genera *Amallophora* and *Scolecithricella* in *Scolecithrix*, and forms a new family, Diaixidae, and the genus *Diaixis* to receive *Scolecithrix hibernica* Scott. *Scolecithricella* Sars includes such species as *Scolecithrix minor* Brady (Sars, :02, p. 54), in which the sensory appendages of the anterior maxilliped are all vermiform, and the fifth feet are present in the female, but 1-jointed and lamellar. Sars (:02b, p. 51) also considers his genus *Scaphocalanus* (Sars, :00, p. 35) to be identical with *Amallophora magna* Scott, which, according to Giesbrecht ('98, p. 45), is probably the same as *Scolecithrix cristata* Giesbrecht. Sars (:02b, p. 55) is also of this opinion. Wolfenden (:04, p. 120) also favors the division of the sub-family Scolecithricinae (genus *Scolecithrix?*) into the genera *Scolecithrix, Amallophora,* and *Lophothrix*. Giesbrecht (:02, p. 26, foot-note) states that in his opinion the large number of species in *Scolecithrix* can not be separated into well-defined genera, and, from what I know of the group, this is my belief also. Accordingly I shall, for the present at any rate, treat all the members of *Scolecithrix* as belonging to the same genus. It may be well to state that Giesbrecht (:02, p. 26) recognizes the new genus *Racovitzanus* in the sub-family on the basis of the unpaired rostrum and the presence of a rudimentary inner ramus on the fifth pair of feet in the female.

Scolecithrix frontalis Giesbrecht.

Pl. 9, fig. 14; pl. 13, fig. 70.

Lophothrix frontalis, Giesbrecht ('95), p. 254, pl. 3, figs. 1-3.
Scolecithrix frontalis, Giesbrecht ('98), p. 49, fig. 10.

Female: Forehead lengthened, with a low crest (Pl. 9, fig. 14); last thoracic segments fused. The second and third segments of the abdomen are broader than long, the third slightly shorter than the first. Anterior antennae 24-jointed, reaching about to the end of the body; rami of posterior antennae about

equal in length; second basal of maxilla with five bristles, inner ramus with eight, outer with nine. Anterior maxilliped with pencillate appendages. First joint of outer ramus of first foot without marginal spine. Fifth foot 3-jointed, terminal joint not much longer than the others, with three heavy bristles (Pl. 13, fig. 70).

Length: Female, 6 mm.

Coloration: Rather opaque and without pigment.

Occurrence: Common through summer of 1905 in deeper hauls.

Scolecithrix magna (Scott).

Pl. 9, fig. 13; pl. 11, fig. 38; pl. 12, figs. 52, 64; pl. 13, fig. 72.

Scolecithrix cristata, Giesbrecht ('95), p. 252, pl. 2, figs. 6-8; pl. 3, figs. 1-5; ('98), p. 48, fig. 8.
Amallophora magna, Scott ('93), p. 55, pl. 4, figs. 5-9.
Amallophora magna, Sars (:02b), p. 55, pls. 34-35.
Scaphocalanus acrocephalus, Sars (:00), p. 36, pls. 7, 8, 9; (:02b), p. 51.

Female: Forehead (Pl. 9, fig. 13) with a low and rather long crest; last two thoracic segments fused; rostral filaments long and slender. The last thoracic segment ends laterally in a small rounded projection (Pl. 11, fig. 38). The two middle segments of the abdomen are about equal in length, shorter than the genital segment, and about twice as long as the anal segment. Anterior antennae 22-jointed, reaching a little beyond the cephalothorax. Second basal of maxilla with four bristles, inner ramus with seven. Sensory appendages of anterior maxilliped pencillate and vermiform. First basal of fourth foot with plumose inner marginal; first joint of outer ramus of first foot (Pl. 12, fig. 52) without marginal bristle, second joint with a very small one and third joint with a large one. Marginal spine of second joint of outer ramus of second foot longer than the curved marginal of the first joint or than those of the third (Pl. 12, fig. 64). Third foot, and especially the fourth, with shorter spines. Fifth foot (Pl. 13, fig. 72) 2-jointed, with three bristles at the end, the one on the inner margin being the longer; the outer marginal is small.

Length: Female, 4.4 mm.

Coloration: Rather opaque and without pigment.

Occurrence: One female, Coll. 1030.

This animal is undoubtedly *S. magna* (Scott), although the fifth feet vary slightly from his and Giesbrecht's drawings, especially in the relative and actual lengths of the spines.

Scolecithrix inornata n. sp.

Pl. 9, fig. 18; pl. 11, fig. 37; pl. 13, figs. 65, 73.

Female: Head without crest, regularly rounded (Pl. 9, fig. 18). Last thoracic segment rounded at sides, but with an indentation above and below the middle of the posterior border (Pl. 11, fig. 37). Genital segment as long as the next two, the second as long as the third and anal together; the anal segment is about half as long as the preceding one. All of the abdominal segments are broader than long. The maxilla has four bristles on the second basal, eight on the outer ramus, and seven on the inner ramus; first outer marginal lobe with nine. The anterior maxilliped has three vermiform and five pencillate sensory appendages. First foot with 3-jointed outer ramus, all the joints having outer marginal spines, those of the first two being of equal lengths. The outer marginals of the outer ramus of the second foot are all of nearly equal lengths; the faces of the rami are set with spines, the larger ones being on the inner ramus. The teeth of the terminal saw are very closely set (Pl. 13, fig. 65). The spines become smaller in the third and fourth pairs. The fifth feet are 2-jointed, with two heavy terminal spines, the inner one being slightly larger (Pl. 13, fig. 73).

Length: Female, 4.3 mm.

Coloration: Slight yellowish tinge to the body, in formalin.

Occurrence: One female, Coll. 1030. Type in the collection of the University of California.

The fifth feet resemble those of *S. auropecten* Giesbrecht, but the bristling of the maxilla and the relative sizes of the animals (*auoropecten* 1.8 mm. long) are distinguishing characters.

Genus **Xanthocalanus** Giesbrecht.

Xanthocalanus, Giesbrecht ('92), p. 57, 286; ('98), p. 49.

Head separate from thorax, fourth thoracic segment fused with fifth. Abdomen of female 4-segmented, symmetrical. Anterior antennae reaching to end of body at least, 24-jointed. Abdomen of male 5-segmented; right anterior antenna 17-jointed. Anterior maxilliped provided with characteristic sensory appendages, some of them pencillate (Pl. 12, fig. 60). The mandible, maxilla, and first maxilliped reduced in the male, the latter with but one pencillate sensory appendage. Swimming feet of both sexes as in *Scolecithrix;* fifth feet in female 2-, 3-, or 4-jointed. The right fifth foot is lacking or shortened in the male, the left uniramous 5-jointed.

Xanthocalanus similis n. sp

Pl. 9, fig. 1; pl. 10, fig. 24; pl. 12, figs. 60, 61; pl. 13, figs. 71, 77.

Female: Head with a crest, rostrum short and heavy, bifid; the last thoracic segment ends laterally in sharp angles, but not spines (Pl. 9, fig. 1). Genital and anal segments equal in length, the second segment the longest of the four. Anterior antennae extend back as far as the posterior border of the cephalothorax. The anterior maxilliped has seven pencillate sensory appendages and one long, vermiform process (Pl. 12, fig. 60), and a very long, heavy, curved hook on the terminal lobe. The second maxilliped has a short pencillate sensory process on the outer margin of the first basal near the base of the joint. Swimming feet as in other species of the genus, except that the terminal saw in the second, third (Pl. 13, fig. 71), and fourth pairs has a second row of teeth inside the usual denticulations. The second row, extending from the base of the saw, is about one-third the length of the latter. The fifth feet are clearly 4-jointed (Pl. 13, fig. 77) and thickly covered with spines; the last joint ends in two short, heavier spines, the terminal one longer than the outer one. There is a somewhat similar terminal spine on the outer margin of the third joint of the foot.

Length: Female, 6.5 mm.

Coloration: Whitish, translucent, and without pigment.

Occurrence: One female, Coll. 1030. Type in the collection of the University of California.

This species resembles *X. cristatus* Wolfenden (:04, p. 119, pl. 9, figs. 18, 19), but differs from it in the number of joints of the fifth feet, his specimen having 3-jointed feet. The fifth pair being 4-jointed in *X. similis* makes it distinct from all other species. The presence of the second row of teeth or serrations on the terminal saw of the last three pairs of swimming feet is a distinctive character also; at least Wolfenden does not mention such a point. The anterior antennae in *similis* are longer than in *critatus*.

X. similis closely resembles *Scolecithrix chelifer* I. C. Thompson (:03, p. 21, pl. 5, figs. 1-9) in the possession of two rows of teeth on the terminal saws; and the drawing Thompson gives of the mandible (anterior maxilliped?) (fig. 4) is much like the anterior maxilliped in *X. similis* or *X. cristatus* Wolfenden (:04, p. 119) in the possession of the heavy hook. However, Thompson's species has the anterior antennae 23-jointed, and the head does not seem to be distinct from the thorax. These characters, as well as the absence of the crest on the head, make it doubtful if *S. chelifer* is the same as *X. similis*.

Family CENTROPAGIDAE.

Genue **Metridia** Boeck.

Metridia, Giesbrecht ('92), p. 61, 339; ('98), p. 105.
Metridia, Esterly (:05), p. 177.

Metridia princeps Giesbrecht.

Pl. 11, fig. 41; pl. 13, fig. 79; pl. 14, fig. 97.

Metridia princeps, Giesbrecht ('92), p. 340, pl. 33, figs. 3, 18, 35, 40; ('98), p. 107.
Metridia princeps, Thompson (:03), p. 24, pl. 6, figs. 3, 4. (Male.)

Female: Forehead seen from above is truncate, rostral filaments borne on a papilla; sides of last thoracic segments rounded. Abdomen 3-jointed, genital segment longer than last two; anal

segment half as long as middle one. Furcal blades five or six times as long as broad. Anterior antennae reaching beyond end of furca by about the last joint. Fifth feet 4-jointed, last joint with three apical bristles, all of which are plumose; the basal joint with a tuft of long hairs (Pl. 13, fig. 79).

Male: Similar to female, but head not as broad, and furca not entirely symmetrical (Pl. 11, fig. 41). Abdomen 5-jointed, anal and genital segments of equal lengths; the third segment is the longest of the five. Grasping antenna on the left side, reaching back to end of furca. First joint of fifth foot on right side (Pl. 14, fig. 97) with a long spine.

Length: Female, 8-8.5 mm. Male, 7-8 mm.

Coloration: Very translucent and without pigment.

Occurrence: Two males were taken with five females which are undoubtedly *M. princeps*. Coll. 1030.

Metridia atra n. sp.

Pl. 9, figs. 15, 16; pl. 11, figs. 39, 40; pl. 13, fig. 78; pl. 14, fig. 95.

Front of head produced into a rather prominent process, rostral filaments long, slender, and plumose (Pl. 9, fig. 15). The sides of the last thoracic segment end in a strong point; furca symmetrical in both sexes, each blade as broad as long (Pl. 11, fig. 39). The anal segment has on each side a bluntly conical projection which reaches back about to the base of the outer marginal furcal bristle (Pl. 11, figs. 39, 40). The furca has a blunt process between the two outer terminal bristles (Pl. 11, fig. 39). The inner marginal or dorsal furcal bristle is extremely slender as compared with the others. The anterior antennae of the female are 23-jointed and reach beyond the furca; grasping antenna on right side. Right fifth foot of male longer than the left; second and third joints of outer ramus of right foot with spines on inner border, second joint of outer ramus of left with a heavy process extending along outer border (Pl. 14, fig. 95). Fifth foot of female 4-jointed, the last joint with three apical bristles, the innermost not plumose (Pl. 13, fig. 78).

Length: Female, 11.5-12 mm. Male, 9 mm.

Coloration: Both sexes are alike; black pigment in cephalothorax except the most anterior portion of the head; it is absent.

from the abdomen (except for traces), anterior and posterior antennae, but abundant in the feet and their bristles. The color is striking, since it gives the animal as a whole a black or grayish black appearance.

Occurrence: Three males, one female, Coll. 1030. Type in the collection of the University of California.

The species is probably allied to *M. scotti* Giesbrecht, but the presence of spines on the inner border of the right fifth foot seems to be a specific character.

Metridia ignota n. sp.

Pl. 9, fig. 20.

Female: Forehead slightly protruding (Pl. 9, fig. 20) into a rounded projection, below which the frontal hairs are situated on a rounded eminence. Rostrum rather stiff. The last thoracic segment is rounded at the sides and rather truncate. The furca is six times as long as broad and as long as the anal segment. The latter is only slightly shorter than the genital segment, and the genital segment is twice as long as the middle segment. The basal joint of the anterior antennae has three straight spines, of which the middle one is the shortest. The fifth feet are 4-jointed, terminal joint with three bristles of about equal lengths; the second joint has a spinose bristle on the outer margin which reaches beyond the end of the last joint of the foot; the third joint is provided with a stout spine on the outer margin.

Length: Female, 5.8 mm.

Coloration: Very translucent, no pigment.

Occurrence: One female, Coll. 1030. Type in the collection of the University of California.

M. ignota resembles *M. princeps* Giesbrecht somewhat, but the shape of the head, the relative lengths of the abdominal segments, and the fifth feet will distinguish the two.

Genus **Disseta** Giesbrecht.

Disseta, Giesbrecht ('92), p. 63, 369; ('98), p. 112.

Female: Allied to *Lucicutia* Giesbrecht. Left half of furca larger than the right (Pl. 11, fig. 45), and bristles longer and

thicker, especially the second terminal. Rostral filaments long and fairly stout, springing from a papilla. Fourth and fifth thoracic segments fused, abdomen 4-segmented. Anterior antennae 25-jointed; mouth parts as in *Lucicutia* except that the first outer marginal lobe of the maxilla has nine bristles. Rami of all the feet 3-jointed; the inner marginal bristle of the second joint of the outer ramus of the fifth pair is awl-shaped (Pl. 13, fig. 69); the terminal joint of the inner rami of the second and third feet has eight bristles (instead of five or six), that of the fifth feet with six.

Male (new): Head rounded, separate from thorax, last two thoracic segments fused. Abdomen 5-segmented, left blade of furca longer than right. Grasping antenna on left side, 21-jointed, longer than body, portion beyond the geniculation 4-jointed; mouth parts as in female. Fifth feet not grasping organs (Pl. 14, figs. 88, 94), with 3-jointed rami; the outer rami are similar in both feet, though not identical; second basal of each side with a hirsute, flap-like appendage, that of the left foot the longer; terminal joints of inner rami with six bristles. Terminal spine of outer ramus of right foot (Pl. 14, fig. 94) longer than that of the left (Pl. 14, fig. 88); second joint of outer ramus of left foot with a heavier process than in the right foot.

Disseta grandis n. sp.

Pl. 9, fig. 21; pl. 11, figs. 45, 46; pl. 13, fig. 69; pl. 14, figs. 88, 94.

Female: Rather closely resembling *D. palumboi* Giesbrecht, but much larger (*D. palumboi* 5.7 mm.). There are also differences in the structure of the fifth feet and mandibular blade, and the last thoracic segment is asymmetrical, being longer on the left side. The genital segment has a rather more rounded outline than in *D. palumboi,* the orifice is of a different shape, and the segment is asymmetrical (Pl. 11, fig. 46).

Male: Characterized in the generic description.

Length: Female, 8.3 mm. Male, 7.6 mm.

Coloration: The females have a slight amount of orange material in the intestine and the feet are reddish; the males are translucent and without pigment.

Occurrence: Three males and three females, winter trip to San Clemente. Types in the collection of the University of California.

Genus **Augaptilus** Giesbrecht.

Augaptilus, Giesbrecht ('92), p. 65, 400; ('98), p. 120.
Augaptilus, Esterly (:05), p. 187.

Augaptilus rostratus n. sp.

Pl. 9, fig. 19; pl. 11, fig. 42; pl. 12, figs. 57, 63; pl. 13, fig. 75.

Female: Head rounded, rostrum bifid, the prongs short and hooked (Pl. 9, fig. 19). Cephalothorax of 5 segments, abdomen of three, genital segment five times as long as second (Pl. 11, fig. 42), anal three times as long as second; furca symmetrical, rami about twice as long as broad. Anterior antennae 25-jointed, extending beyond furca for one-fourth their length. Inner ramus of posterior antenna much longer than outer; mandible biramous, blade (Pl. 12, fig. 57) long, with three teeth; first outer marginal lobe of maxilla with nine bristles, first inner marginal with eleven, outer ramus with two, second basal plus inner ramus with one; bristles of maxillipeds with characteristic armature. Swimming feet not unusual, outer marginal bristle of first joint of outer ramus of first foot extending beyond distal end of terminal joint (Pl. 12, fig. 63). Rami of fifth feet 3-jointed, terminal joint of outer ramus with two outer marginals and three inner marginals; outer marginal of second basal very long and slender (Pl. 13, fig. 75).

Length: Female, 6.8 mm.

Coloration: Translucent, without pigment, except for brown in the mouth region.

Occurrence: One female, Coll. 1030. Type in the collection of the University of California.

Genus **Arietellus** Giesbrecht.

Arietellus, Giesbrecht ('92), p. 66, 415; ('98), p. 124.
Arietellus, Esterly (:05), p. 189.

Arietellus major n. sp.

Pl. 9, fig. 17; pl. 11, figs. 43, 44; pl. 12, fig. 56; pl. 13, fig. 80.

Female: The head, in lateral view, is prolonged into a blunt process (Pl. 9, fig. 17); sides of last thoracic segment rounded, but with a blunt projection in the middle of the posterior border (Pl. 11, fig. 43). Abdomen and furca symmetrical (Pl. 11, fig. 44), genital segment with a very slight ventral convexity, as long as anal segment and nearly as long as the second and third together. Furcal rami two and one-fourth times as long as broad. Anterior antennae 20-jointed, not as long as the cephalothorax; mouth parts and swimming feet as in *A. setosus* Giesbrecht. Fifth feet of the same general shape as in *A. setosus,* but the terminal spine of the outer ramus is much shorter, and curved (Pl. 13, fig. 80).

Length: Female, 6.2 mm.

Coloration: Slight reddish tinge to mouth parts, otherwise translucent.

Occurrence: One female, on the San Clemente trip. Type in the collection of the University of California.

Arietellus major is readily distinguishable from *A. setosus* Giesbrecht by the shape of the head and the fifth feet.

Family PONTELLIDAE.

Genus **Labidocera** Lubbock.

Labidocera, Giesbrecht ('92), p. 70, 444; ('98), p. 132.
Labidocera, Esterly (:05), p. 199.
Labidocera, Wheeler, ('99), p. 178.

Labidocera jollae n. sp.

Pl. 9, figs. 22, 23; pl. 12, figs. 50, 51, 53; pl. 14, figs. 89, 91.

Male: Head with lateral hooks (Pl. 9, fig. 22); last thoracic segment symmetrical (Pl. 12, fig. 53), ending in rather sharp points. Rostrum seemingly asymmetrical (Pl. 9, fig. 23), the left prong being very long and sharp, the right short and stout. Genital segment of abdomen longer than any of the others, second

and third of equal lengths; furcal blades four times as long as broad (Pl. 12, fig. 53). The left anterior antenna is as long as the cephalothorax exclusive of the last segment. Fifth feet: the right (Pl. 14, fig. 91) slender and comparatively simple in structure, terminal joint long and curved, the preceding one with a stout process on the inner margin; left foot (Pl. 14, fig. 89) with two teeth on the terminal joint.

Female: Head as in male, rostrum symmetrical; last thoracic segment, abdomen, and furca asymmetrical, the thorax ending on each side in pointed wing-like projections (Pl. 12, figs. 50, 51). Anterior antennae reaching to the last thoracic segment. Fifth feet simple, inner ramus rudimentary, outer with three apical teeth and one in the middle of the outer border.

Length: Male, 2.4 mm. Female, 2.6 mm.

Coloration: Slight greenish hue when alive; colorless in formalin.

Occurrence: One male in the cove of La Jolla, January 2, 1906, 7 p.m. One female was taken on the surface three and one-half miles from La Jolla, June 26, 1905. Types in the collection of the University of California.

The structure in the fifth feet in this species places it near *L. nerii* Kroyer, but the lateral hooks on the head make it distinct from the latter. In the possession of these hooks it approaches *L. wollastoni* Lubbock and *L. kroyeri* Brady, but differs from the former species in the structure of the fifth feet, and from the latter in the last thoracic segment. The peculiar asymmetry of the rostrum in the male, if not an individual deformity, is also a distinct character.

Genus **Pontellopsis** Brady.

Pontellopsis (part), Brady ('83), pp. 85, 87.
Monops, Giesbrecht ('92), p. 72, 486.
Monops, Wheeler ('99), p. 182.
Pontellopsis, Giesbrecht ('98), p. 145.

Head without lateral hooks, asymmetrical in male, and without dorsal or ventral eye-lenses. The ventral eye ranges in shape from flatly convex to spherical; rostral filaments long and delicate. Fourth and fifth thoracic segments fused, lateral angles

ending usually in sharp points, asymmetrical in the male. Abdomen of female of one or two segments; that of male of five; asymmetrical in both sexes. Anterior antennae of female 16-jointed; grasping antenna with enlarged and broadened middle portion (Pl. 12, fig. 59), terminal portion 2-jointed. Mandibular blade with blunt teeth; in the maxilla the second basal is hardly half as long as the second lobe of the inner margin. The distal bristles of the second maxilliped are long compared with the proximal ones and sparsely spinose. Second maxilliped 5-jointed. Inner ramus of first foot 3-jointed, that of second to fourth feet 2-jointed. Fifth feet as in *Labidocera,* but the left foot in the male has not even a rudimentary inner ramus.

Pontellopsis occidentalis n. sp.

Pl. 11, figs. 47, 48, 49; pl. 12, fig. 59; pl. 13, fig. 68; pl. 14, figs. 92, 96.

Female: The last thoracic segment ends in long points which extend back farther than the middle of the abdomen (Pl. 11, fig. 48); abdomen very obscurely 2-segmented, asymmetrical, being prolonged on the right side. Left furcal blade broader than the right, but no longer. There is a knob-like protuberance on the right side of the genital segment at the posterior border. The anterior antennae extend back to the suture between the second and third thoracic segments. The fifth foot is biramous, each ramus 1-jointed (Pl. 13, fig. 68); the outer ramus ends in two teeth of about equal length, and there is a tooth on the inner margin which is twice as long as the apical ones and much heavier. The outer margin of the ramus has three short spines; the inner ramus is bifid at the tip, and half as long as the outer ramus.

Male: The last thoracic segment ends in long points as in the female, but is not quite symmetrical, since the point on the right side is longer and bent slightly toward the left (Pl. 11, fig. 49). The abdomen is not very asymmetrical; the first and second segments have spines on the right side (Pl. 11, fig. 47). Fifth foot: Right foot in the form of a forceps (Pl. 14, fig. 96); first joint of outer ramus with a heavy, blunt process. The terminal joint of the left foot (Pl. 14, fig. 92) is thickly pubescent on the inner

margin. The second basal of each foot is without a plumose bristle.

Length: Female, 3.8 mm. Male, 3 mm.

Coloration: The entire animal is bluish, and the color extends into the bristles of the appendages.

Occurrence: The animals were rather common during the summer and were always taken at the surface. Types in the collection of the University of California.

The male may be distinguished from other species of the genus by the shape of the fifth foot and the abdomen. The species resembles *P. villosa* Brady, but the thorax and appendages are not pubescent; the other characters mentioned are also differential.

Calanus robustior Giesbrecht.

Pl. 14, fig. 81.

The female was reported previously (Esterly, :05, p. 129). The male was taken in Coll. 1030.

Length: 3.3 mm.

Coloration: Opaque, and without pigment; general appearance is whitish.

The specimen placed here has two or three small bristles on the inner ramus of the left fifth foot (Pl. 14, fig. 81), but otherwise conforms to Giesbrecht's description.

Heterorhabdus longicornis Giesbrecht.

Pl. 13, fig. 74.

The male was taken previous to the past summer (Esterly, :05, p. 186). One female was obtained in Coll. 1030.

Length: Female, 3.4 mm.

Coloration: Translucent, without pigment.

Heterorhabdus spinifrons Claus.

Pl. 14, fig. 93.

The female was obtained in 1904 (Esterly, :05, p. 183), and a male was taken in 1905 in Coll. 1030.

Length: Female, 3 mm.

Coloration: Translucent and without pigment.

APPENDIX.

List of species which have been described since 1897 for the genera dealt with in this paper:—

Augaptilus fungifera, Steuer (:04), p. 597.
gibbus, Wolfenden (:04), p. 122.
magnus, Wolfenden (:04), p. 122.
zetesios, Wolfenden (:02), p. 369, pl. 3.

Euchaeta antarcticus, Giesbrecht (:03), p. 21, pl. 3, figs. 1-8.
austrina, Giesbrecht (:03), p. 22, pl. 3, figs. 9-16.
glacialis (Hansen), Sars (:02a), p. 40, pl. 27 (=*E. norvegica,* part).
oceana, Thompson (:03), p. 19, pl. 2, figs. 1-9.

Euchirella carinata, Wolfenden (:02), p. 366; (:04), p. 115.
curticauda var. *atlantica,* Wolfenden (:04), p. 116.

Gaetanus caudani (new?), Wolfenden (:04), p. 125, pl. 9, figs. 20, 21, 22.
denticulatus, Aurivillius ('98), p. 30, figs. 1, 2, 3.
major, Wolfenden (:04), p. 114, pl. 9, figs. 7, 8.

Labidocera aestiva, Wheeler ('99), p. 178, fig. 16.
trispinosa, Esterly (:05), p. 200, fig. 48.
kroyeri var. *gallensis,* Thompson and Scott (:03), p. 251, pl. 2, figs. 8, 9.
kroyeri var. *stylifera,* Thompson and Scott (:03), p. 252, pl. 2, figs. 8, 9.
pectinata, Thompson and Scott (:03), p. 252, pl. 2, figs. 10-14.

Metridia gerlacheri, Giesbrecht (:03), p. 37, pl. 5, figs. 6-14.
normani female, Wolfenden (:04), p. 125, pl. 9, figs. 39, 40.
?venusta male, Thompson (:03), p. 24, pl. 6, figs. 1, 2.
Pontellopsis herdmani, Thompson and Scott (:03), p. 253, pl. 2, figs. 15-17.

Scolecithrix atlanticus, Wolfenden (:04), p. 119, pl. 9, figs. 5, 6.
brevicornis, Sars (:00), p. 46, pl. 10. Considered as *Amallophora brevicornis,* Sars (:02b), p. 53.
?chelifer, Thompson (:03), p. 21, pl. 5, figs. 1-9.
glacialis, Giesbrecht (:03), p. 25, pl. 4, figs. 1-7.
magna, Sars (:02b), p. 55, pls. 34-35. (Sars considers the species as belonging to *Amallophora.*)
pacifica, Esterly (:05), p. 168, fig. 30.
securifrons, Wolfenden (:04), p. 168, fig. 30. (Held by Wolfenden to belong to *Lophothrix*).
similis, Wolfenden (:04), p. 119, pl. 9, figs. 5, 6.
subdentata, Esterly (:05), p. 167, fig. 29.

Spinocalanus abyssalis male, Sars (:03), p. 157, suppl. pl. 3.
longicornis, Sars (:00), p. 75, pl. 22; (:02a), p. 22, pl. 12. (= *S. abyssalis* Giesbrecht.)
magnus, Wolfenden (:04), p. 118.

Xanthocalanus atlanticus, Wolfenden (:04), p. 119, pl. 9, figs. 24, 25, 33.
borealis, Sars (:00), p. 49, pl. 11.
cristatus, Wolfenden (:04), p. 119, pl. 9, figs. 18, 19.
fragilis, Aurivillius ('98), p. 23, figs. 4, 5, 6.
giesbrechti, Thompson (:03), p. 22, pl. 4, figs. 1-9.
simplex, Aurivillius ('98), p. 33, fig. 7.
subagilis, Wolfenden (:04), p. 118, pl. 9, figs. 17, 32, 32a.

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DESCRIPTION OF PLATES.

PLATE IX.

Fig. 1. *Xanthocalanus similis* n. sp. Female, head from side, × 40.

Fig. 2. *Chirundina streetsi* Giesbrecht. Female, head from side, × 40.

Fig. 3. *Gaetanus unicornis* n. sp. Female, head from side, × 40.

Fig. 4. *Gaetanus brevicornis* n. sp. Female, head from side, × 40.

Fig. 5. *Gaetanus clarus* n. sp. Male, head from side, × 40.

Fig. 6. *Euchirella curticauda* Giesbrecht. Female, head from side, × 70.

Fig. 7. *Euchaeta dubia* n. sp. Male, head from side, × 40.

Fig. 8. *Euchaeta spinifera* n. sp. Male, head from side, × 70.

Fig. 9. *Euchaeta propinqua* n. sp. Female, head from side, × 70.

Fig. 10. *Euchaeta tonsa* Giesbrecht. Female, head from side, × 70.

Fig. 11. *Euchaeta californica* n. sp. Female, head from side, × 70.

Fig. 12. *Euchaeta tenuis* n. sp. Female, head from side, × 70.

Fig. 13. *Scolecithrix magna* (Scott). Female, head from side, × 70.

Fig. 14. *Scolecithrix frontalis* Giesbrecht. Female, head from side, × 40.

Fig. 15. *Metridia atra* n. sp. Male, head from side, × 40.

Fig. 16. *Metridia atra* n. sp. Male, head and basals of left anterior antenna, dorsal, × 25.

Fig. 17. *Arietellus major* n. sp. Female, head from side, × 70.

Fig. 18. *Scolecithrix inornata* n. sp. Female, head from side, × 40.

Fig. 19. *Augaptilus rostratus* n. sp. Female, head from side, × 40.

Fig. 20. *Metridia ignota* n. sp. Female, head from side, × 70.

Fig. 21. *Disseta grandis* n. sp. Female, head from side, × 40.

Fig. 22. *Labidocera jollae* n. sp. Male, head dorsal, × 40.

Fig. 23. *Labidocera jollae* n. sp. Male, head from side, × 70.

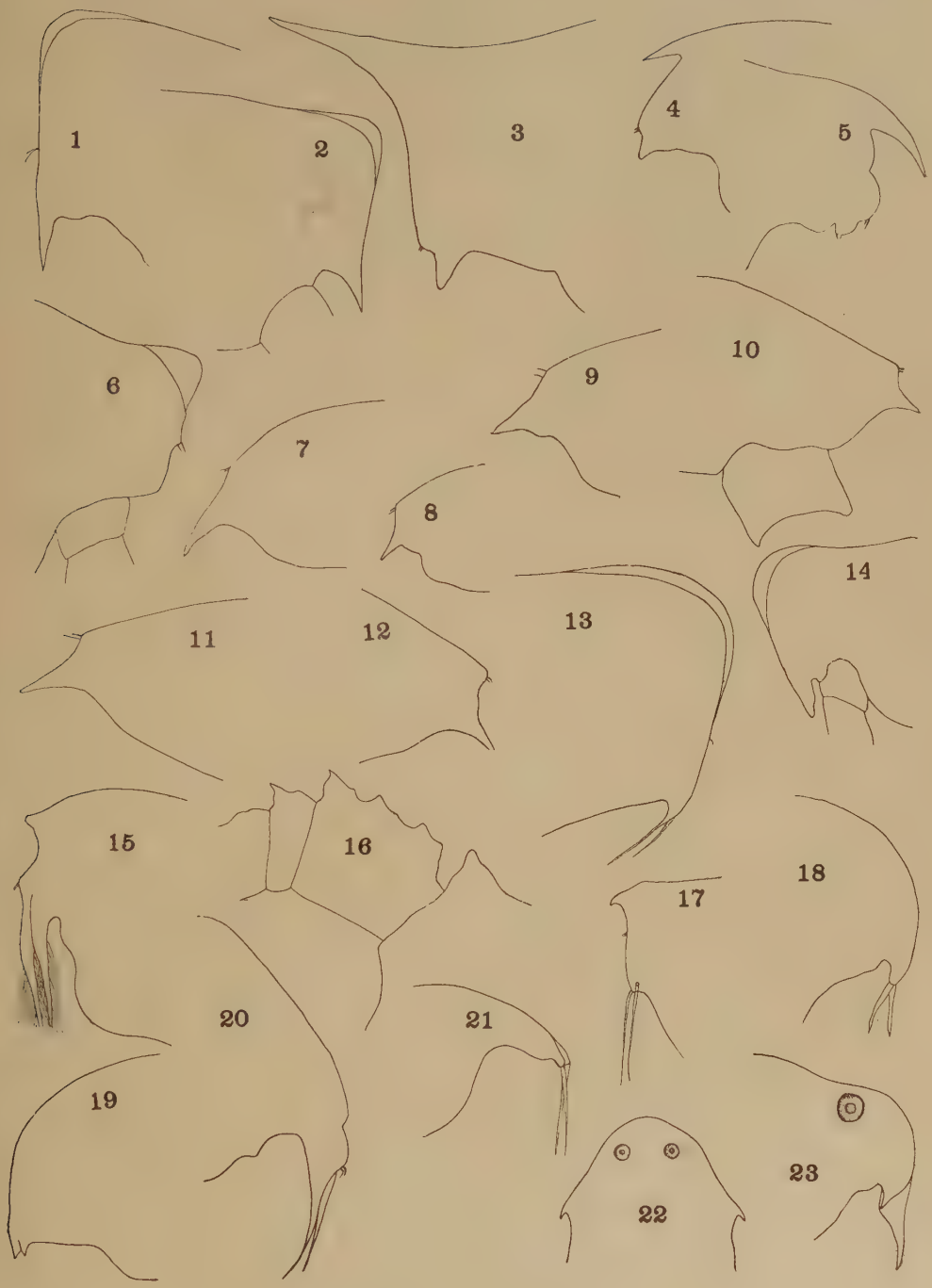
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PLATE X.

Fig. 24. *Xanthocalanus similis* n. sp. Female, last thoracic segment lateral, × 40.

Fig. 25. *Gaetanus unicornis* n. sp. Female, last thoracic segment and abdomen lateral, × 40.

Fig. 26. *Euchaeta californica* n. sp. Female, genital segment ventral, × 40.

Fig. 27. *Euchirella curticauda* Giesbrecht. Female, abdomen and part of last thoracic segment lateral, × 70.

Fig. 28. *Chirundina streetsi* Giesbrecht. Female, abdomen and last thoracic segment ventral, × 40.

Fig. 29. *Euchaeta tenuis* n. sp. Female, genital and last thoracic segments lateral, × 40.

Fig. 30. *Euchaeta propinqua* n. sp. Female, genital segment ventral, × 40.

Fig. 31. *Euchaeta tenuis* n. sp. Female, genital segment ventral, × 40.

Fig. 32. *Euchaeta tonsa* Giesbrecht. Female, genital and last thoracic segments lateral, × 40.

Fig. 33. *Euchaeta propinqua* n. sp. Female, genital and last thoracic segments lateral, × 40.

Fig. 34. *Euchaeta californica* n. sp. Female, genital and last thoracic segments lateral, × 40.

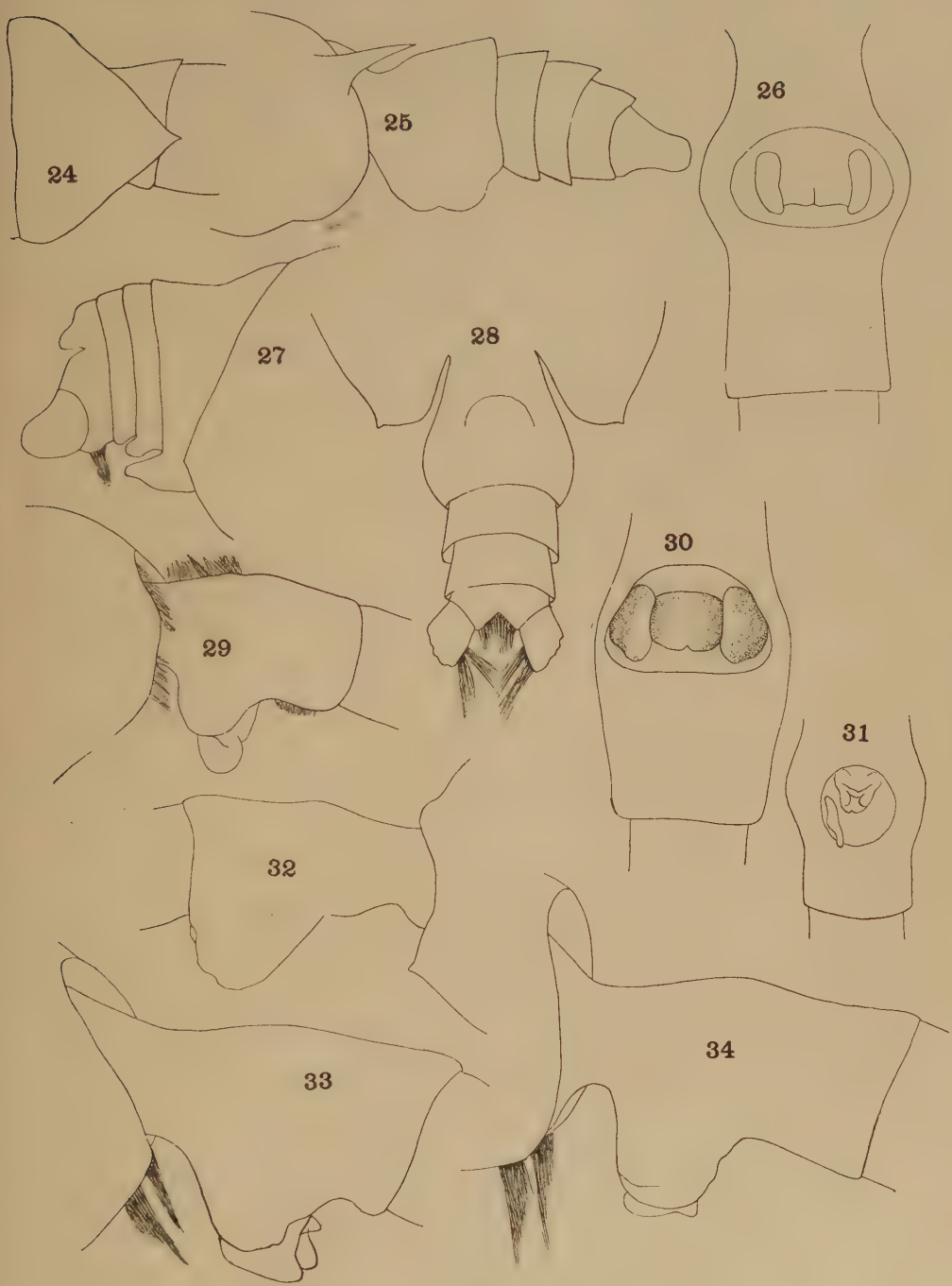
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PLATE XI.

Fig. 35. *Euchaeta spinifera* n. sp. Male, last thoracic segment lateral, × 40.

Fig. 36. *Euchaeta dubia* n. sp. Male, genital and last thoracic segments lateral, × 40.

Fig. 37. *Scolecithrix inornata* n. sp. Female, abdomen and last thoracic segment lateral, × 40.

Fig. 38. *Scolecithrix magna* (Scott). Female, outline of last thoracic segment lateral, × 70.

Fig. 39. *Metridia atra* n. sp. Male, furca and anal segment dorsal, × 25.

Fig. 40. *Metridia atra* n. sp. Male, furca and anal segment lateral, × 70.

Fig. 41. *Metridia princeps* Giesbrecht. Male, furca and anal segment dorsal, × 25.

Fig. 42. *Augaptilus rostratus* n. sp. Female, abdomen lateral × 40.

Fig. 43. *Arietellus major* n. sp. Female, abdomen and last thoracic segments lateral, × 25.

Fig. 44. *Arietellus major* n. sp. Female, abdomen ventral, × 25.

Fig. 45. *Disseta grandis* n. sp. Male, abdomen and last thoracic segment lateral, × 25.

Fig. 46. *Disseta grandis* n sp. Female, abdomen ventral, × 25.

Fig. 47. *Pontellopsis occidentalis* n. sp. Male, abdomen ventral, × 40.

Fig. 48. *Pontellopsis occidentalis* n sp. Female, abdomen and last thoracic segment dorsal, × 40.

Fig. 49. *Pontellopsis occidentalis* n. sp. Male, last thoracic segment dorsal, × 40.

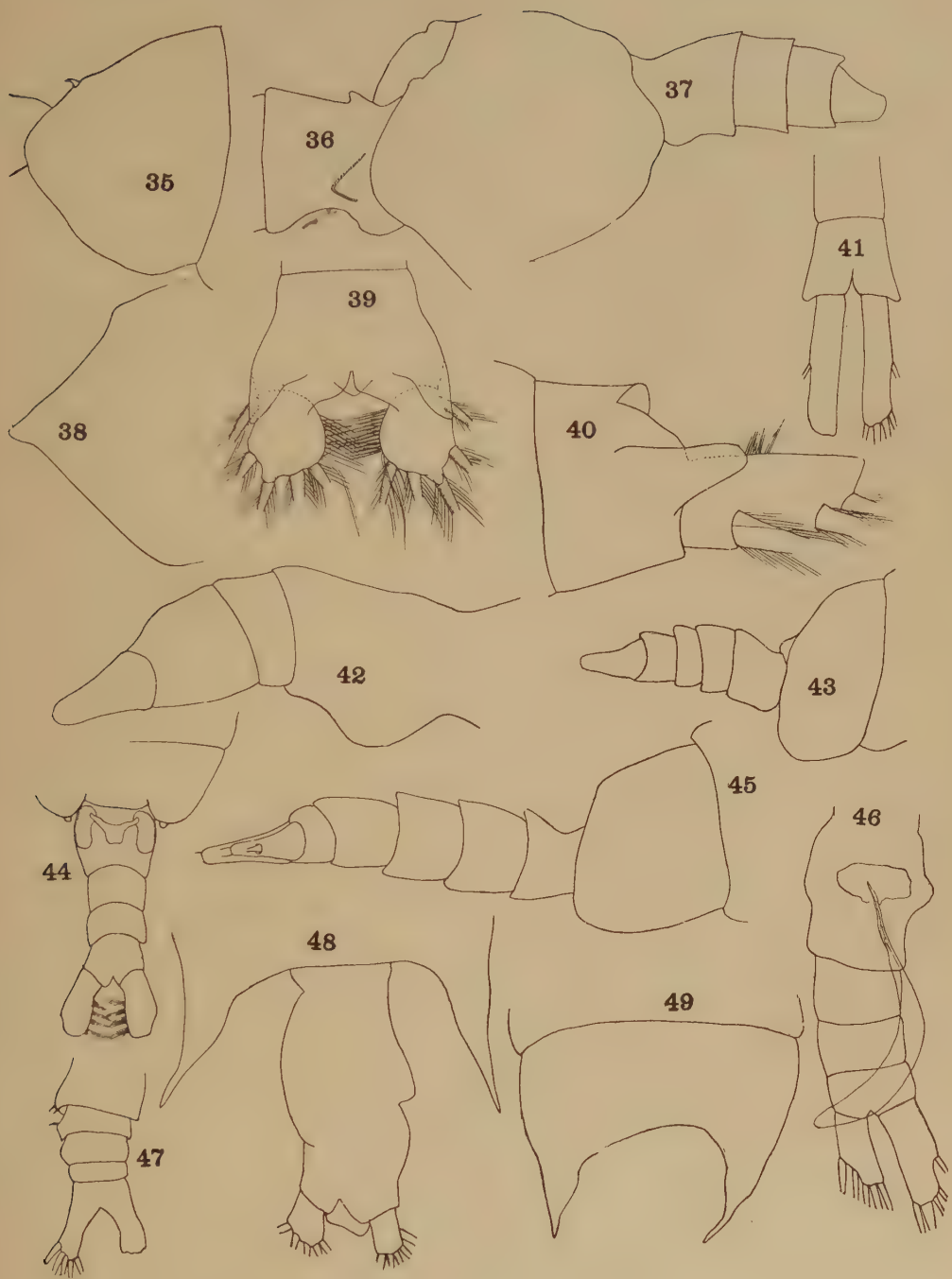
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PLATE XII.

Fig. 50. *Labidocera jollae* n. sp. Female, abdomen and part of thorax dorsal, × 70.

Fig. 51. *Labidocera jollae* n. sp. Female, abdomen and last thoracic segment lateral, × 40.

Fig. 52. *Scolecithrix magna* (Scott). Female, outer ramus of first foot, × 70.

Fig. 53. *Labidocera jollae* n. sp. Male, abdomen and last thoracic segment dorsal, × 70.

Fig. 54. *Gaetanus unicornis* n. sp. Female, first basal of posterior maxilliped, × 70.

Fig. 55. *Gaetanus brevicornis* n. sp. Female, first basal of posterior maxilliped, × 70.

Fig. 56. *Arietellus major* n. sp. Female, blade of mandible, × 70.

Fig. 57. *Augaptilus rostratus* n. sp. Female, blade of mandible, × 70.

Fig. 58. *Chirundina streetsi* Giesbrecht. Male, first foot, × 70. Bristles not shown on inner ramus.

Fig. 59. *Pontellopsis occidentalis* n. sp. Male, middle portion of grasping antenna, × 40. Bristles and aesthetasks not shown.

Fig. 60. *Xanthocalanus similis* n. sp. Female, distal portion of anterior maxilliped showing the sensory appendages, × 70.

Fig. 61. *Xanthocalanus similis* n. sp. First foot, × 70.

Fig. 62. *Euchirella curticauda* Giesbrecht. Female, posterior antenna, × 70. Bristles not shown.

Fig. 63. *Augaptilus rostratus* n. sp. Female, first foot, × 70.

Fig. 64. *Scolecithrix magna* (Scott). Female, second foot, × 70.

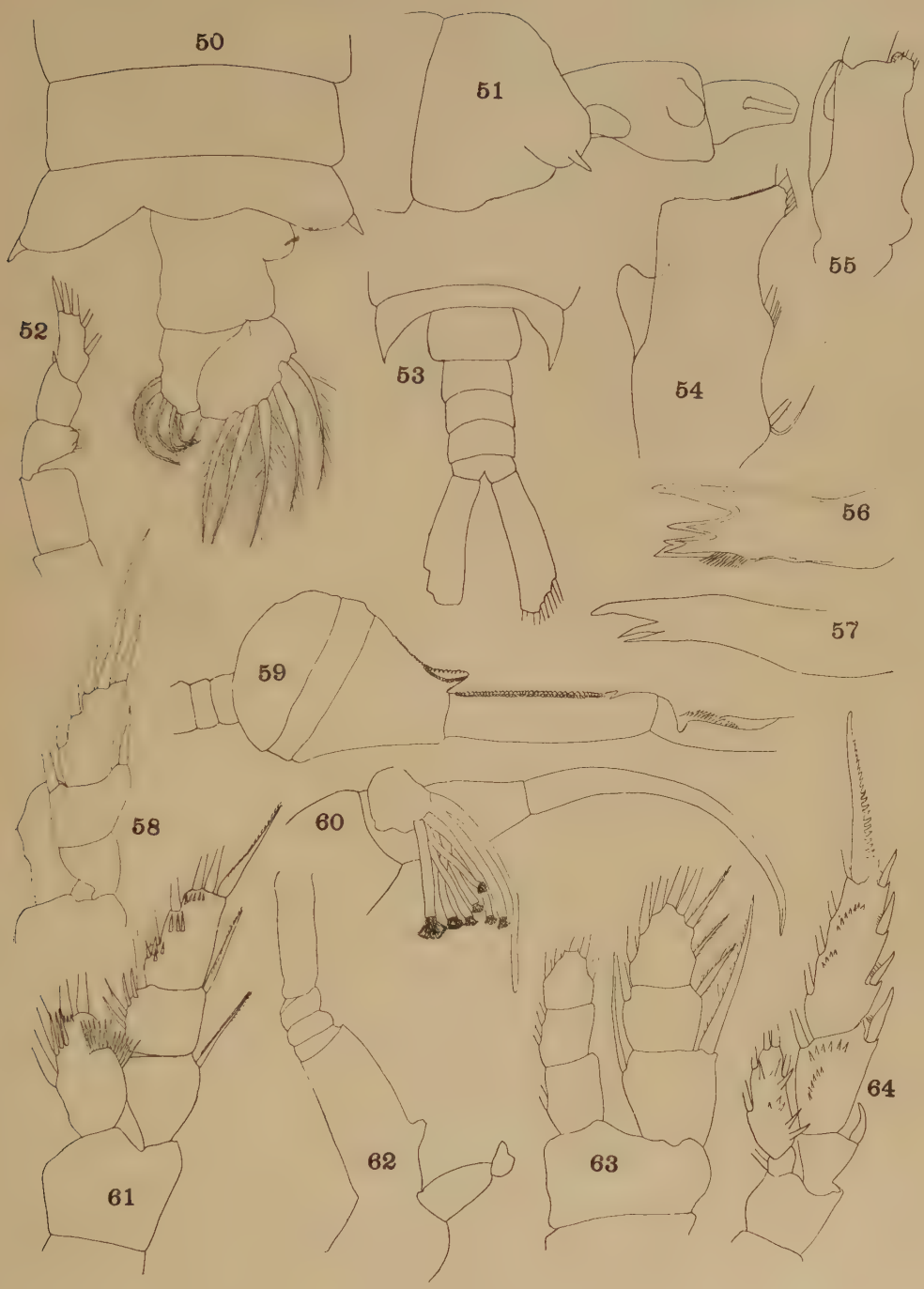
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PLATE XIII.

Fig. 65. *Scolecithrix inornata* n. sp. Female, fourth foot, × 40.

Fig. 66. *Euchaeta dubia* n. sp. Male, distal portion of second joint, and third joint of outer ramus of second foot, × 40.

Fig. 67. *Euchirella curticauda* Giesbrecht. Female, distal portion of inner margin of first basal of fourth foot, × 190.

Fig. 68. *Pontellopsis occidentalis* n. sp. Female, fifth foot, × 70.

Fig. 69. *Disseta grandis* n. sp. Female, fifth foot, × 40.

Fig. 70. *Scolecithrix frontalis* Giesbrecht. Female, fifth feet, × 70.

Fig. 71. *Xanthocalanus similis* n. sp. Female, third foot, × 40.

Fig. 72. *Scolecithrix magna* (Scott). Female, fifth foot, × 190.

Fig. 73. *Scolecithrix inornata* n. sp. Female, fifth feet, × 40.

Fig. 74. *Heterornabaus longicornis* Giesbrecht. Female, fifth foot, × 70.

Fig. 75. *Augaptilus rostratus* n. sp. Female, outer ramus of fifth foot, × 70.

Fig. 76. *Gaetanus unicornis* n. sp. Female, distal portion of inner margin of first basal of fourth foot, × 190.

Fig. 77. *Xanthocalanus similis* n. sp. Female, fifth foot, × 70.

Fig. 78. *Metridia atra* n. sp. Female, fifth foot, × 40.

Fig. 79. *Metridia princeps* Giesbrecht. Female, fifth foot, × 70.

Fig. 80. *Arietellus major* n. sp. Female, fifth foot, × 70.

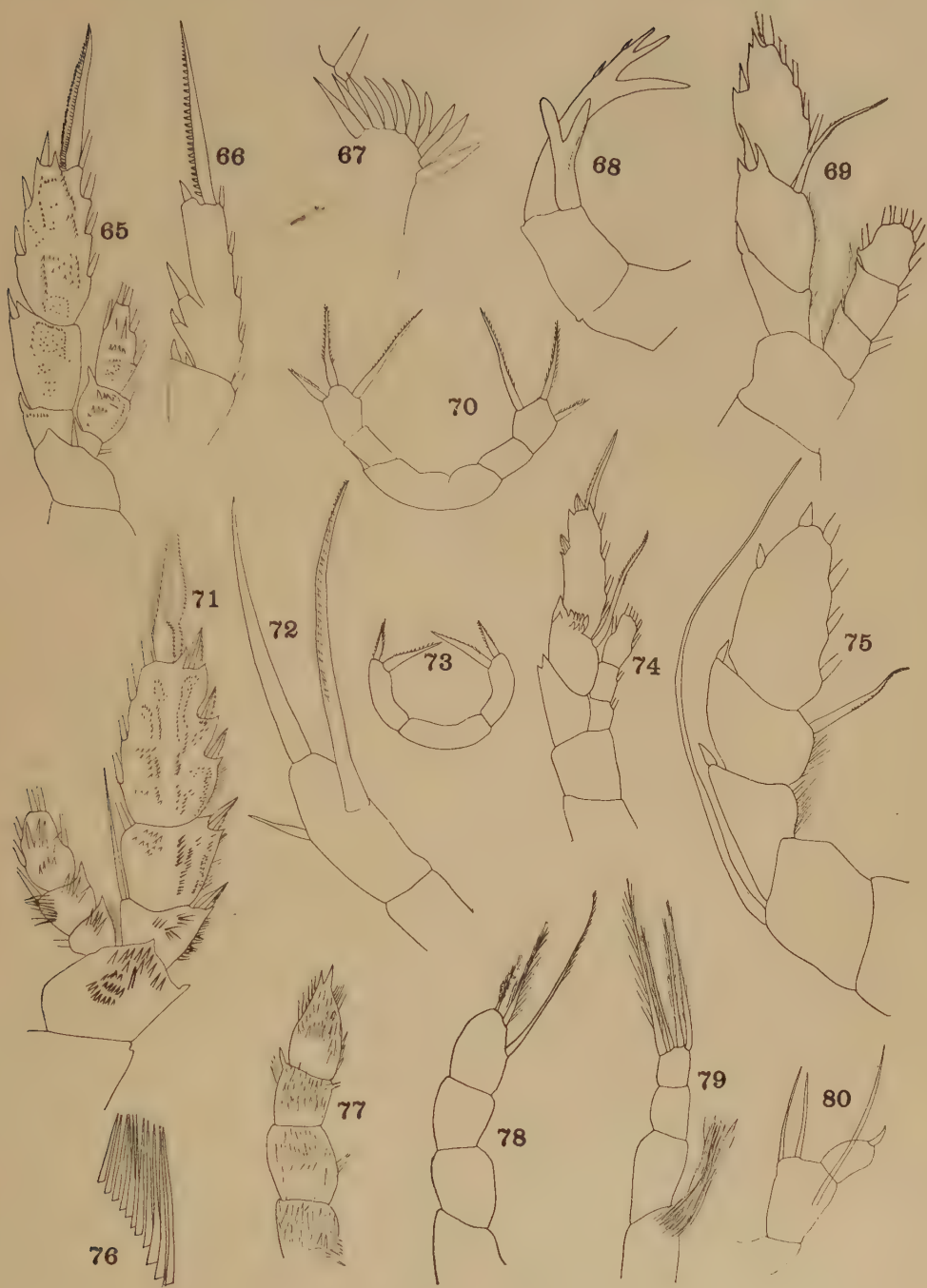
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PLATE XIV.

Fig. 81. *Calanus robustior* Giesbrecht. Male, left fifth foot, × 70.

Figs. 82, 83. *Euchaeta spinifera* n. sp. Male, distal portion of second joint of outer ramus of left fifth foot, × 70.

Fig. 84. *Euchaeta dubia* n. sp. Male, fifth pair of feet, × 25.

Fig. 85. *Euchaeta dubia* n. sp. Male, distal portion of second joint of outer ramus of left fifth foot, × 70.

Fig. 86. *Chirundina streetsi* Giesbrecht. Male, right fifth foot, × 40.

Fig. 87. *Chirundina streetsi* Giesbrecht. Male, left fifth foot, × 40.

Fig. 88. *Disseta grandis* n. sp. Male, left fifth foot, × 40.

Fig. 89. *Labidocera jollae* n. sp. Male, left fifth foot, × 70.

Fig. 90. *Gaetanus clarus* n. sp. Male, fifth feet, × 40. Right foot at left of figure.

Fig. 91. *Labidocera jollae* n. sp. Male, right fifth foot, × 40.

Fig. 92. *Pontellopsis occidentalis* n. sp. Male, left foot of fifth pair, × 40.

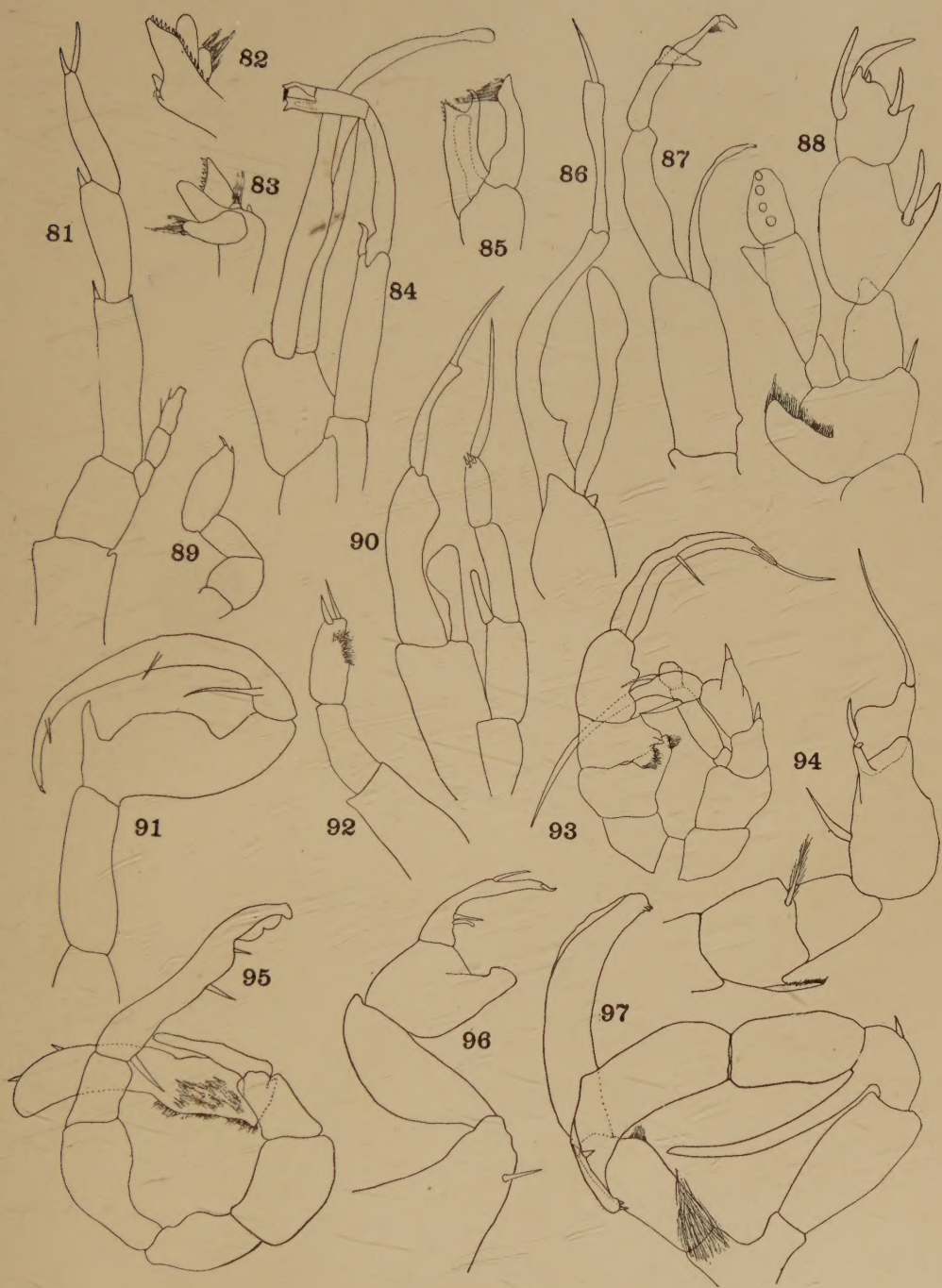
Fig. 93. *Heterorhabdus spinifons* Giesbrecht. Male, fifth feet, × 40.

Fig. 94. *Disseta grandis* n. sp. Male, right fifth foot, × 40.

Fig. 95. *Metridia atra* n. sp. Male, fifth feet, × 25.

Fig. 96. *Pontellopsis occidentalis* n. sp. Male, right fifth foot, × 40.

Fig. 97. *Metridia princeps* Giesbrecht. Male, fifth feet, × 70.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